

## CHAPTER 1 Evolution of an Idea

### *From Geomythology to Hydromythology*

The Preface explains how I came to write a book on hydromythology as it relates to karst in ancient Greece. This chapter traces how my ideas evolved and how they align with the growing discipline of geomythology.

While doing research, I consulted a book published in 1996 called *A Geological Companion to Greece and the Aegean*. Its coauthors are the late British archaeologist Reynold Alleyne Higgins (1916–1993) and his son Michael Denis Higgins, a geologist. Their book gives region-by-region descriptions of geology and describes selected sites of geological, historical, and archaeological interest. The Higgins team also identifies locally important water features such as springs and rivers. On rare occasions, they mention a small number of well-known myths, such as the birth of Zeus in a mountain cave.

The Higgins' book came thirty years after the late Dorothy B. Vitaliano (1916–2008), a technical translator and American geologist specializing in volcanology, coined the word “geomythology.” Her definition originally was “the geologic application of euhemerism,” but later she expanded the definition to include any geologically inspired folklore, including myths and legends. (See Chapter 6 for a brief mention of Euhemerus.)

#### THE ROAD TO GEOMYTHOLOGY: VITALIANO'S CONCEPTION

The backstory of Dorothy Vitaliano's conceptual path involves modern and ancient Greece. In 1939 the late Spyridon Marinatos (1901–1974), a renowned Greek archaeologist, published a now-famous theory that

attributed the final collapse of the Minoan civilization on Crete to one particularly violent eruption of the Thera volcano, also known as Santorin or Santorini, which is situated in the Aegean Sea near Crete. In Chapter 3 of this book, I highlight the Minoan civilization, and in Chapter 29, I summarize the Bronze-Age eruption of Thera, which is variably dated between 1650 and 1450 BC.

Marinatos's theory about the Minoan collapse was widely and rather uncritically accepted. Blind enthusiasm triggered avalanches of scientific and popular articles for the remainder of the twentieth century.

In 1950 Marinatos offered another theory, suggesting that the Thera cataclysm inspired the Atlantis myth as articulated in two ancient texts: Plato's *Timaeus* and *Critias*. Interestingly, these two dialogues by the Classical Greek philosopher were written more than one thousand years after the catastrophic eruption. Yet the theorists impressed by Marinatos were satisfied that an extreme event would still inspire Plato to write about it a millennium later. Alternately, Plato could have heard about the largest earthquake-related disaster in his own lifetime. When Plato was 55 years old (in 373 BC), the Greek city of Helice disappeared into the southern Gulf of Corinth after an earthquake and tsunami.

In 1960 Greek seismologist Angelos G. Galanopoulos greatly expanded on Marinatos's ideas. That year and over the next eight years, Galanopoulos published a suite of notions that went beyond the boundaries of traditional science.

Firstly and perhaps most plausibly, Galanopoulos proposed that a tsunami caused by the Bronze-Age eruption of Thera inspired the Greek myth of Deucalion's flood (Chapter 10). Secondly and rather implausibly, Galanopoulos expanded on previously published theories and identified the Thera cataclysm as the cause of the plagues and the parting of the Red Sea as described in the Hebrew Bible. Thirdly and without foundation, Galanopoulos connected Thera with the Phaethon myth, which in many interpretations is a celestial myth possibly related to a falling planetary object. (Phaethon was the son of Helius, the Greek Sun god.)

Finally, Galanopoulos resurrected ideas first articulated in the late 1800s. In 1872 a French writer named Louis Figuier proposed that Plato's Atlantis was the island of Thera. In an 1885 lecture, French archaeologist Auguste Nicaise similarly connected Thera and Atlantis. In subsequent decades, archaeologists selected Cretan features of literary Atlantis and connected them with Bronze-Age Minoan artifacts, largely ignoring the

non-Cretan aspects of Atlantis. It was no surprise when Galanopoulos threw caution to the wind, stating that mythical Atlantis was in fact the volcanic island of Thera before its catastrophic Bronze-Age eruption.

Galanopoulos changed two critical definitions to make his theory more plausible. First Galanopoulos suggested that an ancient translation error needed fixing, so he conveniently reduced all of Plato's figures by a factor of ten. Then he disposed of the discrepancy regarding the Pillars of Hercules (Heracles) by suggesting that these imposing landforms were capes Taenarum and Malea in the Greek Peloponnese rather than landforms near the Strait of Gibraltar. With these adjustments in place, Galanopoulos claimed that Lost Atlantis, at its one-tenth scale, was beyond the Peloponnese, buried by the sea inside the main caldera of Thera.

With these claims, Galanopoulos became one among countless theorists over the centuries who believed they found Atlantis. Interestingly, Atlantis almost always is "definitively located" in the home country of the investigator—with the exception of Antarctica, which in 1995 was added to the evergrowing list of speculative locations. Yet the promise of "proving" Atlantis to be a historical fact was a far greater attractant than the likelihood of scholarly criticism, and well-funded waves of international scientists continued to make their way to Thera throughout the twentieth century.

### **Vitaliano Enters**

In 1961 Dorothy Vitaliano read the 1960 journal article by Angelos Galanopoulos that connected the Bronze-Age eruption of Thera with the flood of Deucalion and the myth of Atlantis. She became intrigued by the potential overlap of science and nonscience.

In November 1966 while describing Galanopoulos's ideas to her colleagues at the U.S. Geological Survey, Vitaliano conceived the term "geomythology." In the spirit of Euhemerus, Vitaliano stated, "The geomythologist seeks to find the real geologic event underlying a myth or legend to which it has given rise; thus he helps convert mythology back into history. Involving earth science, history, archaeology, and mythology and folkore, it (geomythology) is as interdisciplinary a subject as one could hope to find."

Six months later at an Indiana University geology colloquium, Vitaliano gave a lecture entitled "Geomythology: The Impact of Geology on History and Legend, with Special Reference to Atlantis." In 1968 a slightly revised

text of the lecture was published by the Indiana University Press in its *Journal of the Folklore Institute*.

In 1973 the same press published Vitaliano's book entitled *Legends of the Earth: Their Geologic Origins*. In the book, Vitaliano examined the possible geologic fundament of selected myths and traditions from around the globe, particularly stories of natural catastrophe.

In 1975 Indiana University hosted a panel discussion entitled "Atlantis: Fact or Fiction." Although most of the notable scholars in attendance dismissed the Atlantis story as pure fiction, John Victor Luce, a professor of classics at Dublin University, presented the view that Plato's Atlantis story is part fiction, part fact, and is based on legends that were popular prior to Plato's lifetime.

This moderate stance is at the heart of geomythology. By definition, geomythologists consider myths with a presumed geologic aspect. The term "geomythology" refers to the study of certain myths and legends whose origins possibly contain memories of actual geologic features and phenomena.

Advocates of geomythology attempt to explain certain myths and legends in terms of geologic events that may have been witnessed by human observers. Over many hundreds of years, the memories are embellished and the facts are modified, but kernels of truth remain.

## A SKEPTICAL INTERLUDE

When it comes to ancient tales and literary narratives, scientists have been reluctant to stray outside their self-prescribed bounds. On the one hand, they are willing to employ Greek mythology in the service of scientific nomenclature. Countless theories, discoveries, technologies, equipment, stars and planets, geological formations, and biological species bear the names of Greek gods, spirits, and heroes. But once scientists have finished shopping for names, they historically have discarded the myths themselves, scorning them as unrealistic, irrational fictions imagined by intellectually childish primitives. And yet modern investigators who are open to the idea of geomythology are hoping to shed new light on a traditionally skeptical field of inquiry.

Vitaliano and other writers have pointed out that modern science creates its own stories that in some ways are more myth-like than ancient myths. We cannot explain the development of landforms, the existence of fossils, prehistoric sedimentary environments, or continental drift,

for example, without proposing narratives regarding what might have happened many thousands of years ago. Some scientific narratives use storylines spanning millions and even billions of years.

Whereas a tale proposed by a rationalist to explain a phenomenon is accepted as a theory and is treated with respect by other self-perceived rationalists, a tale proposed by someone alleged to be irrational and non-scientific is pushed aside as a myth. Rationalists typically discard a myth outright as fanciful storytelling, with no consideration of its possible rationality and physical basis. Yet if a modern myth—a theory—passes muster as being fundamentally scientific, regardless of whether the tale contains unprovable and even fanciful elements, it ultimately becomes accepted as *de facto* truth until either the theory falls out of favor or material discoveries make the theory untenable. Theories are modern myths adjudged by less than one percent of society (i.e., professional scientists) to be worthy of attention.

Despite the reality of scientific mythmaking and despite the groundbreaking yet unorthodox views of Professor Luce, Ms. Vitaliano, and others in the 1960s and 1970s, geomythology as a potentially legitimate scholarly discipline remained undeveloped for more than three decades. I suppose that mainstream scholars wanted to distance themselves from the Atlantis myth, which despite its geological aspects is a subject of great interest for pseudoscientists, neopagans, mystics, esotericists, and occultists (Chapter 29).

Even without a history of scientific consensus, geomythology began to gain mainstream momentum in the early twenty-first century. As the new century progresses, some traditional scientific organizations seem more willing to entertain “fringe” ideas.

### **VITALIANO’S CONCEPTION THIRTY-FIVE YEARS LATER**

As the history of science demonstrates, some ideas initially scorned are eventually welcomed into the scientific fold. This certainly was the case for geomythology, a line of inquiry which Dorothy Vitaliano first defined publicly in 1967. Relegated to the fringe of science for thirty-five years, geomythology began to emerge from the shadows when major geological organizations took an interest. English-language publications about geomyth and ancient Greece started coming to the fore in 2003.

In 2003 the Geological Society of America published in its journal *Geology* a well-received paper documenting that sedimentary and coastal

geology matches Homer's description of Troy's embayment and the lower Scamander River in northwest coastal Anatolia.

In 2004 the first scholarly session on myth and geology was conducted at the thirty-second International Geological Congress in Florence, Italy. At a special symposium on the Mediterranean, Luigi Piccardi of Firenze, Italy's Institute of Geosciences and Earth Resources addressed the relation between geologic phenomena and Mediterranean myths, particularly the ones connected with volcanoes and earthquakes. He cited the cults of Apollo and Archangel Michael as examples of Mediterranean ancient religions with specific geological implications.

In 2007 the Geological Society of London published a peer-reviewed collection of twenty-five papers stemming from the congress in Florence three years earlier. Scientists and scholars addressed geological hazards and, to a lesser extent, historical and literary perspectives, education, and the sacred and cultural values of rocks, fossils, geological formations, and landscape features. The collection was coedited by Piccardi.

In 2005 the International Union of Speleology hosted the fourteenth International Congress of Speleology in Athens, Greece. The post-congress, two-day tour was entitled "Karstic Structures and Geodynamic Regime in the Greek Mythology: On the Footsteps of Poseidon and Hercules from Viotia (Boeotia) up to the Cape Tainaro (Taenarum), Lakonia." Participants visited places where the actions of Poseidon and Hercules (Heracles) were directly connected to karstic structures. The excursion leader was Ilias D. Mariolakos, a professor emeritus at the University of Athens.

Also in 2005 Mariolakos, together with colleagues from the Environmental Education Center of Stylida, Greece, presented a paper at the International Conference on New Water Culture of Southeast European Countries. Mariolakos and his colleagues stated that water will formulate a future "new world order" and proposed the use of mythology in environmental education to encourage a more rational usage of natural resources. The integration of geomythology with Greek tourism has been an ongoing project of the Stylida center since at least the year 2000.

In 2006 the Pulitzer-Prize-winning American journalist William Broad dramatized a recent geological and archaeological study of the ruins of ancient Delphi and its oracle (Chapter 13). In 2007 in the American Pacific Northwest and elsewhere, university seminars and courses were being taught on myth and geology, particularly myths of Native Americans.

Today geomythology encompasses geotourism as well as scientific

topics as diverse as cosmogony, geocatastrophism, volcanism, sea change, sedimentology, surficial geology, fossils, cultural-spiritual beliefs involving geologic features, and religious ritual involving the same. Many mythical storylines have the potential to provide valuable information to the sciences. The “new science” aspect of geom mythology appeals to pseudoscientists, geomancers, and others outside of traditional, mainstream science. Perhaps because it straddles the line between science and nonscience, the discipline of geom mythology remains a fledgling field of inquiry.

### **Real Landscapes**

The past decade of geom mythological developments has demonstrated that ancient narratives can contain reliable information about the physical environment. Ancient peoples experienced their landscapes just as we experience our landscapes today.

Written myths derived from oral traditions contain peoples’ memories of actual environments. Mythtellers did not imagine surreal surroundings to serve as backdrops to their narrative dramas. Instead, the natural landscapes were literal, even though some aspects of the stories were figurative embellishments. Ancient mythographers and geographers tell of a time when the Greek world was more water-abundant and lushly vegetated than the generally deforested, denuded, dry landscape we see today.

My goal with this book is to demonstrate the relevance of ancient descriptions of landscapes and water features to today’s knowledge of hydrology, particularly karst hydrology.

### **KARST, THE GEOMYTHOLOGICAL WALLFLOWER**

Despite the inclusivity of geom mythology, English-language books and journal articles through 2008 rarely contain the word “karst” in association with mythology and ancient Greece. While researching this book, I found only two English-language geology papers containing any significant mention of Southeast Europe’s karst and allusions to Greek mythology. As explained in the third- and fourth-next paragraphs below, these two papers were published by geological societies.

A 1996 journal article in *Environmental Geology* identifies karst as the underlying geological reality of the ancient (and modern) Greek world. The author Dora P. Crouch, an urban historian and a professor emeritus at California’s Rensselaer Polytechnic Institute, credits karst with supplying perennial waters that enabled many important settlements. For



Professor Crouch, karst was the basis of ancient Greek urbanization, in the sense that many cities owed their basic form and urbanistic growth primarily to the karstic hydrosystems of the ground they occupied.

In the journal article, Crouch selectively illustrates the importance of karst water supplies to the siting and development of four ancient Greek settlements: the mainland city of Corinth; the Aegean island of Rhodes; the Ionian city of Priene in coastal Anatolia; and the Sicilian city of Syracuse. But because Crouch's focus is the role of geology in ancient urban history, her journal article and two associated books omit any discussions of mythology.

In 2004 the Geological Society of Greece published an article by Ilias D. Mariolakos, whom I mentioned earlier in this introduction. His article is about Arcadia's Argon Field, the Dini Springs in the Gulf of Argos, and the connection to Poseidon legends.

The 2007 collection of geomythology papers by the Geological Society of London contains one essay about karst that focuses on the Sibillini Mountains of Italy's Central Apennines. Italy is relevant to my book because southern Italy and Sicily once were known as *Magna Graecia* owing to the immense population of ancient Greeks.

Books by scientists about Greek myth and geology rarely mention karst. Even Higgins and Higgins (1996) and Vitaliano (1973) ignore karst *per se* except for a brief definition. Although the authors discuss carbonate terrains, they do not explicitly address the importance of karst in local geology, human settlement, or myth.

Books about Nature myths tend to be treetop surveys by nonscientists who are unaware of the term "karst." An example is Harry Brewster's 1997 compilation of stories about certain ancient Greek rivers, including his modern-day visits to selected sites. Although he occasionally mentions underground water passages, his perspective is literary, and often his narrative is little more than a travel commentary.

Surprisingly, William Broad's book on the oracle of Delphi never once uses the word "karst" despite his detailed coverage of highly speculative geology-based theories. And yet the karst hydrogeology of Mount Parnassus is as important to the natural context as the rocks and faults.

### **From Geomythology to Karstomythology to Hydromythology**

It occurred to me that if volcanologists are confirming ancient literary accounts of prehistoric eruptions, and if geomorphologists are verifying



antiquarian descriptions of coastal landforms, then why aren't karstologists mining old texts for information about karstified terrains? Except for Professor Mariolakos's regional interests in Greece, it appears that nobody has comprehensively synthesized ancient literary narratives with their karstic backdrops. Any existing coverage tends to be cursory, noninterpretive, and slanted toward geotourism rather than toward karst hydrosystems.

As the Preface explains, I decided to investigate hydrology, and especially karst hydrology, as it appears in ancient Greek texts from Homer to Pausanias. The study of karst structures falls mostly under the umbrella of geomorphology. But in my role as a hydromythologist, I focus on Greek myths involving surface-water and groundwater systems, including hydrogeological systems that are karstic.